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A NEW MATHEMATICAL MODEL FOR THE CUTTING STOCK/LEFTOVER PROBLEM

Marcos Nereu Arenales[1], Adriana Cristina Cherri[2*], Douglas N. do Nascimento[3] and Andréa Vianna[3]

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ABSTRACT. This paper addresses the cutting stock/leftover problem (CSLP), which differs from the ordinary cutting stock problem (CSP) by retaining stock leftovers that can be cut in the future to meet new demands. Therefore, leftovers are not considered waste in the current period. A new mathematical model for the CSLP is presented to capture a well-used strategy in the practice of cutting, which consists of partially cutting the objects in stock, and keeping the leftovers to be cut in the next periods. Computational experiments were made for the one-dimensional case, although other dimensions can be considered straightforward.

Keywords: cutting stock problem, usable leftovers, mathematical model, column generation.

1 INTRODUCTION

Cutting Stock Problems (CSP) are central stages in production planning for a number of industries that have to cut paper rolls, steel bobbins, steel bars, wooden hardboards, leather pieces, among others. Basically, CSP consists of cutting large pieces (*objects*) available in stock into a set of smaller pieces (*items*) with specified quantities and sizes by optimizing an objective function, such as minimizing the total length/area/volume of the objects cut, minimizing the total waste or minimizing the cost of the objects cut.

Although there are many articles in the literature on general CSP, many constraints arise in practical situations that lead to the need of developing new mathematical models and new approaches to solve them. Among the various types of CSP in the literature (see Wäscher et al. (2007), for a typology), a problem which has not been fully studied yet, although it often appears in practice, consists of considering usable leftovers when the objects are cut. These leftovers are

*Corresponding author.
[1] Instituto de Ciências Matemáticas e Computação, Universidade de São Paulo. E-mail: arenales@icmc.usp.br
[2] Departamento de Matemática, Universidade Estadual Paulista Júlio de Mesquita Filho. E-mail: adriana@fc.unesp.br
[3] Departamento de Computação, Universidade Estadual Paulista Júlio de Mesquita Filho.
E-mails: douglasnn@fc.unesp.br; vianna@fc.unesp.br